



DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[Docket No. NHTSA-2014-0068]

Toyota Motor North America, Inc.

Grant of Petition for Temporary Exemption from an Electrical Safety Requirement of FMVSS No. 305

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation (DOT).

ACTION: Notice of grant of a petition for a temporary exemption from a provision of Federal Motor Vehicle Safety Standard (FMVSS) No. 305, Electric-powered vehicles: electrolyte spillage and electrical shock protection.

SUMMARY: In accordance with the procedures in 49 CFR Part 555, Toyota Motor North America, Inc. (Toyota) petitioned the agency for a temporary exemption from one portion of FMVSS No. 305 that requires manufacturers to maintain a certain level of electrical isolation (or reduce the voltage below specified levels) of high voltage electrical components in an electric vehicle (EV) in the event of a crash. Toyota states that their forthcoming fuel cell vehicle (FCV) models cannot meet this requirement due to certain design characteristics innate to FCVs. Toyota is instead using alternative strategies to help ensure that occupants and first responders are protected in the event of a crash. After reviewing Toyota's petition and the comments received, the agency has decided to grant the petition. The agency has determined that Toyota's petition for exemption would facilitate the development or field evaluation of a low-emission motor vehicle and would not unreasonably reduce the safety level of that vehicle.

DATES: This exemption is effective from June 1, 2015 to May 31, 2017.

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I. Summary of NHTSA's Decision to Grant Toyota's Petition

The subject of Toyota's petition is a portion of the electrical safety requirements in paragraph S5.3 of FMVSS No. 305 that are intended to reduce the risk of high voltage electrical shock to the vehicle's occupants and the first responders in the event of a crash. Toyota stated in its petition that certain design aspects innate to Fuel Cell Vehicles (FCVs) preclude the vehicle from meeting those electrical safety requirements in paragraph S5.3 of FMVSS No. 305 under certain conditions. However, Toyota stated that it will implement various alternative strategies to ensure that the vehicle occupants and first responders are protected from an undue risk of high voltage electrical shock after a crash.

Because they assert that they cannot meet the requirements of FMVSS No. 305 due to design characteristics innate to FCVs, they also state that they cannot comply with the standard at the conclusion of the exemption period. However, they have instead submitted a petition for rulemaking to suggest changes to FMVSS No. 305 to help accommodate FCVs while still ensuring a high level of protection for vehicle occupants and first responders from dangerous electrical shock in the event of a crash.

As further discussed below, we are granting Toyota's petition because the exemption would facilitate the development or field evaluation of a low-emission vehicle and would not unreasonably reduce the safety level of that vehicle. While Toyota petitioned for this exemption under two alternative bases, we have decided to grant Toyota's petition on the basis that it would facilitate the development of a low-emission vehicle. Therefore, this document will not address the merits of Toyota's alternative basis for the petition (prevent the sale of a vehicle whose overall safety is at least equivalent to compliant vehicles).

II. Statutory Authority for Temporary Exemptions

The National Traffic and Motor Vehicle Safety Act ("Motor Vehicle Safety Act"), codified at 49 U.S.C. Chapter 301, provides the Secretary of Transportation authority to exempt, on a temporary basis and under specified circumstances, motor vehicles from a motor vehicle safety standard or bumper standard. This authority is set forth at 49 U.S.C. § 30113. The Secretary has delegated the authority for implementing this section to NHTSA.

The Act authorizes the Secretary to grant a temporary exemption to a vehicle manufacturer if it is consistent with the public interest and it meets certain conditions.

The relevant condition for Toyota’s petition requires the Secretary to find that “the exemption would make the development or field evaluation of a low-emission motor vehicle easier and would not unreasonably lower the safety level of that vehicle.”¹

NHTSA established 49 CFR Part 555, Temporary Exemption from Motor Vehicle Safety and Bumper Standards, to implement the statutory provisions concerning temporary exemptions. The requirements specified in 49 CFR 555.5 state that the petitioner must set forth the basis of the application by providing the required information under Part 555.6, and the reasons why the exemption would be in the public interest and consistent with the objectives of 49 U.S.C. Chapter 301.

A petition under the basis that the exemption would make easier the development or field evaluation of a low-emission motor vehicle must include the information specified in 49 CFR 555.6(c). The main requirements of that section include: (1) substantiation that the vehicle is a low-emission vehicle; (2) documentation establishing that a temporary exemption would not unreasonably lower the safety of a vehicle; (3) substantiation that a temporary exemption would facilitate the development or field evaluation of the vehicle; and (4) a statement of whether the petitioner intends to conform to the standard at the end of the exemption period.

III. The Electrical Safety Requirement in FMVSS No. 305 and its Purpose

In 2000, the agency created Federal Motor Vehicle Safety Standard (FMVSS) No. 305 to help facilitate the safe introduction of EVs into the marketplace.² While FMVSS No. 305 addresses a number of safety concerns relevant to EVs (e.g., battery retention and electrolyte spillage), paragraph S5.3 of the standard (at issue here) requires EVs to

¹ See 49 U.S.C. § 30113.

² See 65 FR 57980 (Sept. 27, 2000).

maintain electrical isolation of various major electrical components (e.g., components related to the vehicle's propulsion) after specified crash tests. The purpose of the requirements in S5.3 is to reduce the risk of high voltage electrical shock to the vehicle's occupants and first responders in the event of a crash.³

NHTSA published its most recent major update to the S5.3 requirements in 2010.⁴ In this update, NHTSA expanded the types of electrical components that would be covered by the requirement and the options available for complying with the requirement. Namely, the agency expanded the coverage of the standard to include other high voltage components of the EV beyond the propulsion battery. Further, the updated requirements recognize the different safety implications between Alternating Current (AC) and Direct Current (DC) by establishing different requirements for each type of electrical component. FMVSS No. 305 further specifies various crash test conditions under which a vehicle is required to meet the aforementioned requirements. Depending on the particular crash scenario (e.g., frontal barrier, rear moving barrier, and side moving deformable barrier), the tests can be conducted at any speed up to a maximum speed of 48, 80, or 54 km/h, respectively.⁵

IV. Overview of Petition

In accordance with 49 U.S.C. § 30113 and the procedures in 49 CFR Part 555, Toyota Motor North America, Inc. (Toyota) submitted a petition asking the agency for a temporary exemption from the electrical safety requirements in paragraph S5.3 of FMVSS No. 305. They stated that they plan to manufacture FCV models and that certain

³ *See id.*

⁴ *See* 75 FR 33515 (June 14, 2010). NHTSA also answered petitions for reconsideration on this final rule on July 29, 2011 dealing with clarifying the definitions and test procedures of the June 14, 2010 final rule. *See* 76 FR 45436.

⁵ The speed condition for each test is specified in paragraphs S6.1 to S6.3.

aspects of their FCV design prevent it from meeting the requirements in S5.3 of FMVSS No. 305.

As described above, the requirements of paragraph S5.3 state that (after certain specified crash tests) a vehicle must maintain an electrical isolation of 500 ohms/volt for AC high voltage sources (and DC high voltage sources without electrical isolation monitoring) or 100 ohms/volt for DC high voltage sources with electrical isolation monitoring. Vehicles subject to FMVSS No. 305 must meet these requirements when tested under any speed up to a maximum speed of 48, 54, or 80 km/h (depending on the particular crash test).

Toyota stated in its petition that its FCVs will be able to meet the requirements of paragraph S5.3 of FMVSS No. 305 under some, but not all, of the specified test speeds. The company stated that under higher speeds (e.g., speeds similar to when an air bag would deploy), an automatic disconnect mechanism activates to ensure that the high voltage components will meet the requirements of paragraph S5.3. However, Toyota stated that the automatic disconnect mechanism in its FCVs will not be triggered in impacts at relatively low speeds. Toyota believes it would not be appropriate to equip FCVs with sensors that would trigger the automatic disconnect mechanism following minor impacts (such as parking lot collisions or curb contacts) because it is not possible to drive the vehicle after the system is disconnected. Toyota stated that its FCV would be unable to meet the requirements of paragraph S5.3 in such low speed crash conditions where the automatic disconnect mechanism is not triggered.⁶

⁶ Additional information is available in Toyota's petition. The petition is available in the docket referenced at the beginning of this document.

In support of their petition, Toyota stated that this exemption would make the development or field evaluation of a low-emission motor vehicle easier and would not unreasonably lower the safety level of the vehicle.⁷ Toyota requests the exemption (under either basis) for 2 years (June 1, 2015 to May 31, 2017) and has stated that it would not produce more than 2,500 exempted FCVs within any 12-month period during the exemption.

In support of its assertion that the exemption would facilitate the development of a low-emission vehicle, Toyota states that its FCVs qualify as a low-emission vehicle because its FCVs will not emit particulate matter. Further, Toyota states that the FCV's noncompliance with paragraph S5.3 of FMVSS No. 305 would not unreasonably lower the safety of the vehicle because the vehicle has additional safety features designed to protect vehicle occupants and first responders in the event of a crash. First, Toyota equipped the FCV high voltage sources with physical barriers that they believe would prevent any direct physical contact with live voltage sources after the crash. Second, Toyota ensured that all physical barriers would be grounded to the chassis with a grounding resistance of less than 0.1 ohms. The company states that this would protect against any indirect contact with high voltage sources. Finally, Toyota states that the high voltage sources would continue to maintain an electrical isolation of 100 ohms/volt. Through the combination of these three attributes, Toyota believes that the

⁷ Toyota also petitioned under an alternative basis stating that compliance with FMVSS No. 305 would prevent it from selling a motor vehicle with an overall safety level at least equal to the overall safety level of non-exempt vehicles. However, as stated above, we have decided to grant this exemption under the basis that it would facilitate the development of a low-emission vehicle. Thus, we do not reach the merits of Toyota's alternative basis in this document. To view the application, go to <http://www.regulations.gov> and enter the docket number set forth in the heading of this document.

noncompliance with paragraph S5.3 would not unreasonably lower the safety of its FCVs.

V. Notice of Receipt

On June 11, 2014, we published in the Federal Register (79 FR 33639) a notice of receipt of Toyota's petition for temporary exemption, and provided an opportunity for public comment. We received one comment from American Honda Motor Co., Inc., (Honda) seeking to clarify that their fuel cell vehicle (the Honda FCX Clarity) is compliant with the requirements of FMVSS No. 305 and that their future vehicles will also be compliant with the standard.

In addition, Honda supported Toyota's assertion that the current electrical isolation requirements in S5.3 may not accommodate lower electrical isolation requirements for DC high voltage sources such as fuel cells and propulsion batteries. Honda agreed that vehicles cannot take advantage of the separate electrical isolation requirements specified in S5.3 for DC high voltage sources (100 ohms/volt) in low speed crashes when the automatic disconnect is not triggered. Honda stated that in such low speed crashes, the AC and DC sources are connected and so the isolation resistance measured across the AC source is the combined resistance of the AC and DC sources.⁸ In order to obtain an electrical isolation measurement greater than or equal to 500 ohms/volt across the AC high voltage source when the automatic disconnect is not triggered, the DC source would need to have an electrical isolation greater than or equal to 500 ohms/volt.

⁸ The AC and DC high voltage sources are in parallel configuration so that the effective resistance of the combined system is $R_{AC} \times R_{DC} / (R_{AC} + R_{DC})$, where R_{AC} is the isolation resistance of the AC source and R_{DC} is the isolation resistance of the DC source.

VI. Agency Analysis and Decision

After reviewing Toyota's petition, the agency has determined that granting a temporary exemption in this case would make the development or field evaluation of a low-emission motor vehicle easier without unreasonably lowering the safety level of that vehicle and would be consistent with the public interest.

a. Makes Easier the Development or Field Evaluation of a Low-Emission Vehicle

First, we conclude that Toyota's FCV models would be considered a low-emission vehicle for the purposes of the § 30113 of the Motor Vehicle Safety Act because FCVs are vehicles that do not emit any air pollutants from their tailpipes.⁹ Further, we believe that the temporary exemption would make easier the development of those vehicles. As Toyota stated in their petition, obtaining field information about new technologies (especially information about consumer reaction and real world performance) would facilitate Toyota's development and decisions on potential modifications to future versions of their FCVs. Given the nature of this technology as a zero-emission technology and the information that Toyota intends to obtain from the field operation of these vehicles, we believe that Toyota has fulfilled this criterion.

b. Does Not Unreasonably Lower the Safety of the Vehicle

Second, we conclude that granting this temporary exemption would not unreasonably lower the safety of these vehicles. As Toyota described in their petition, their vehicles would comply with the requirements of FMVSS No. 305 under the higher

⁹ A vehicle is considered a low-emission vehicle for the purposes of § 30113 of the Motor Vehicle Safety Act if it emits air pollutants significantly below the standards for new vehicle set under § 202 of the Clean Air Act. Since FCVs do not emit such pollutants, they are considered low-emissions vehicles under § 30113.

speed testing conditions. However, the FCVs would be unable to comply with the standard under testing conditions where the automatic disconnect does not activate to separate the AC and DC high voltage. These test conditions would be the lower speed conditions (such as speeds where an air bag would not deploy).

However, we do not believe that this non-compliance would unreasonably lower the safety of Toyota's FCVs in this case for two reasons. First, Toyota intends to design its FCVs to be fully compliant with FMVSS No. 305 at higher crash speeds. Thus, under many of the crash conditions that can occur in the real world, the Toyota FCVs will be no different from any other vehicle with high voltage electrical components that comply with FMVSS No. 305. Second, Toyota stated in its petition that it will implement alternative safety measures to ensure the safety of the vehicle occupants and first responders will be protected from electric shock hazards after a crash. As described above, Toyota intends to use the combination of three additional safety features (a physical barrier to prevent physical contact with the high voltage source + the grounding of the physical barriers to the chassis + the maintaining of an electrical isolation of 100 ohms/volt) to address the safety concern under lower speed crash conditions.

When considering the narrower set of circumstances under which Toyota's FCVs would be non-compliant with the requirements of FMVSS No. 305 in conjunction with the alternative safety countermeasures that Toyota intends to incorporate, we do not believe that granting the exemption would unreasonably lower the safety of Toyota's FCVs.

c. Consistent with the Public Interest

Finally, we believe that granting Toyota's petition is consistent with the public interest. FCVs implement an alternative fuel technology in motor vehicles. They are zero-emissions like battery electric vehicles. However, as stated in Toyota's petition, they can have driving range, refueling time, and cold weather performance advantages over pure battery electric vehicles. We believe that this temporary exemption would not only increase consumer choice in the vehicle market, but would also help demonstrate to the public the viability of this type of electric vehicle technology. Further, we believe that the information Toyota intends to collect through the field operation of these FCVs (e.g., consumer reaction and real world performance information) will contribute to not only Toyota's development of future FCV models but also the aggregate knowledge of real world use of FCVs.

Additionally, we believe that the requested exemption will have a limited impact on *general* motor vehicle safety because Toyota will be limited to an annual production of 2,500 vehicles under this exemption. Further, prospective purchasers will be notified that the vehicle is exempted from the electrical isolation requirements of FMVSS No. 305. Under § 555.9(b), a manufacturer of an exempted vehicle must affix securely to the windshield or side window of each exempted vehicle a label containing a statement that the vehicle conforms to all applicable FMVSSs in effect on the date of manufacture "except for Standard Nos. [listing the standards by number and title for which an exemption has been granted] exempted pursuant to NHTSA Exemption No. ____." Under § 555.9(c), this information must also be included on the vehicle's certification label.¹⁰

¹⁰ See 49 CFR Part 555.9

VII. Plan to Comply with the Standard at the End of the Exemption Period and Response to Honda's Comment

As Toyota believes that issues inherent with the design of FCVs prevent it from fully complying with the requirements of FMVSS No. 305, Toyota states that it does not anticipate it will be able to comply with the standard in the future. However, it instead stated its intention to petition for rulemaking and recommend to the agency a solution that will ensure the same level of safety as FMVSS No. 305 currently offers while still accommodating the design challenges related to FCVs. We note that Honda also supported the position that this is a technical issue with the standard via their comment that FCVs are unable to take advantage of the lower isolation resistance requirements for DC high voltage sources without an automatic disconnect to separate them from the AC sources.

The agency has already received Toyota's petition for rulemaking on this matter and the agency will be considering the merits of that petition. While we have determined in this notice that Toyota's FCV design (along with their alternative safety measures) do not unreasonably degrade safety for the purposes of this exemption, we have not yet made any determinations regarding Toyota's petition for rulemaking.

VIII. Conclusion

In accordance with 49 U.S.C. 30113(b)(3)(B)(iii), we are granting Toyota NHTSA Temporary Exemption No. EX 14-02 from paragraph S5.3 of FMVSS No. 305 provided that Toyota implements the alternative measures to ensure electrical safety as described above. The exemption shall be effective from June 1, 2015 to May 31, 2017, as indicated in the DATES section of this document.

Authority: 49 U.S.C. 30113; delegations of authority at 49 CFR 1.95.

Issued in Washington, DC, on: December 22, 2014.

under authority delegated in 49 CFR 1.95 and 501.5.

David J. Friedman,
Deputy Administrator.

BILLING CODE 4910-59-P

[FR Doc. 2014-30749 Filed 12/31/2014 at 8:45 am; Publication Date: 01/02/2015]